Effects of maternal nutrient restriction during late gestation on preweaning beef calf plasma glucose concentrations

Allison Sanders

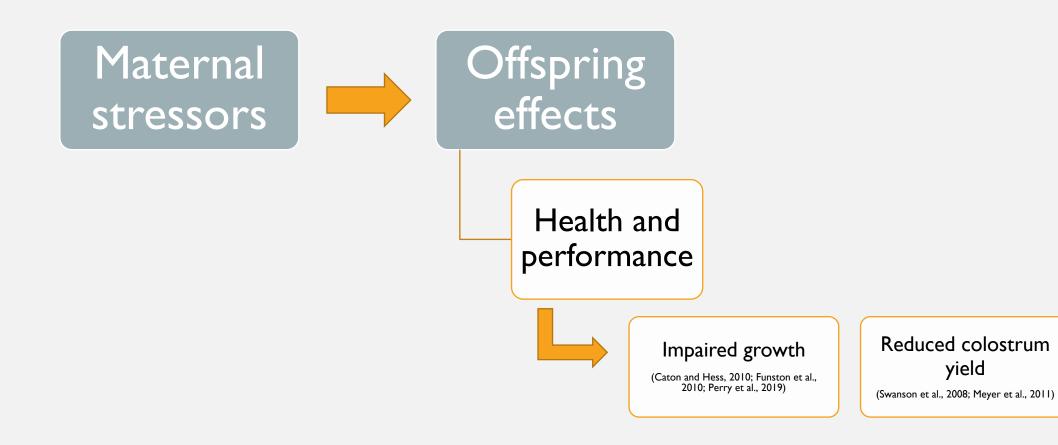


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 - Class of 2023
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 - Lab focus: Developmental programming, maternal nutrition, and efficiency of beef cattle production







PREVIOUS STUDIES

• Nutrient restricted (NR) heifers:

40% less colostrum yield

No difference in calf size at birth

Altered neonatal blood chemistry

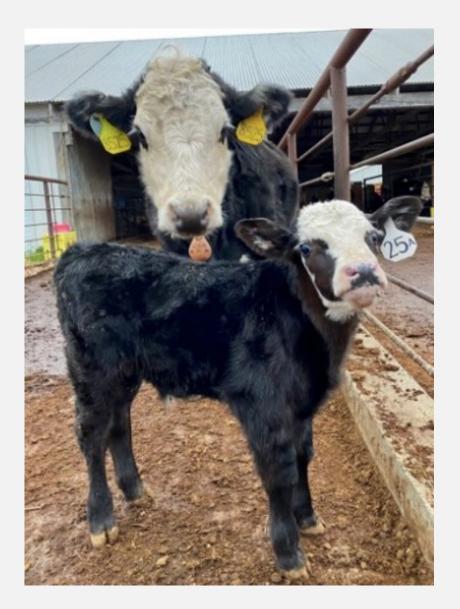
(Wichman et al., 2020)

Hypothesis:

 Late gestation maternal nutrient restriction impairs fetal and postnatal nutrient utilization and development

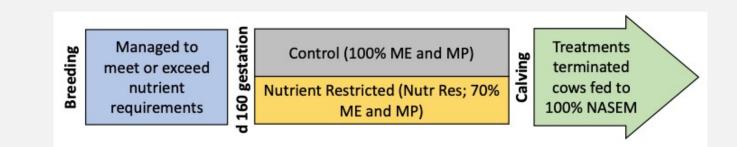
Objective:

 Determine the effects of maternal nutrient restriction during late gestation on plasma glucose concentrations in preweaning calves



METHODS – OVERALL DESIGN

- 26 single-sired fall-calving Sim-Angus Hereford beef heifers; AI to a single sire to calve at 2 yr of age
- Allocated by BW, BCS, expected calving date, and fetal sex to 1 of 2 nutritional planes beginning on d 160 of gestation



METHODS – IMPLEMENTATION

- Heifers housed in 12 partially covered pens (n = 2 to 3/pen); individually fed via Calan gates
- Offered ad libitum low quality chopped hay
- Individually supplemented 1x/day to meet nutritional plane
 - Adjusted weekly based on previous individual intakes
- Calves only had access to milk through day 147 of age



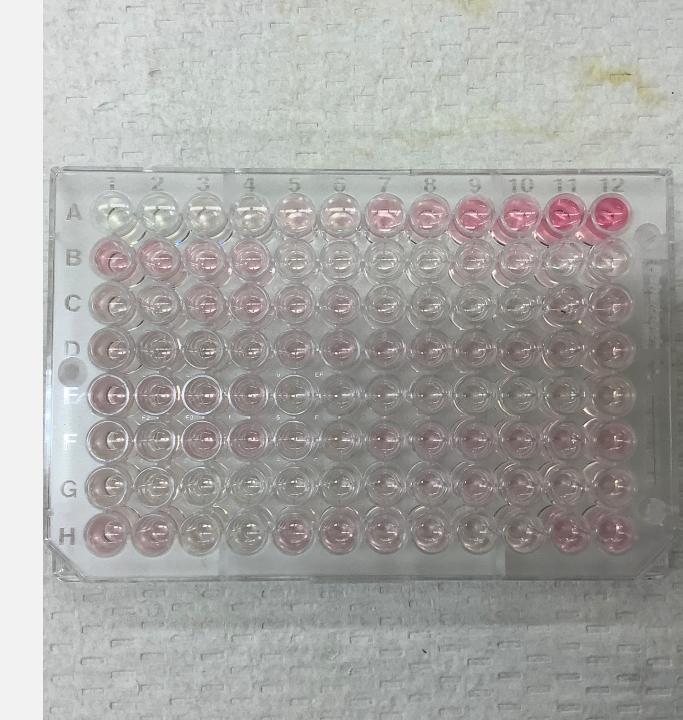


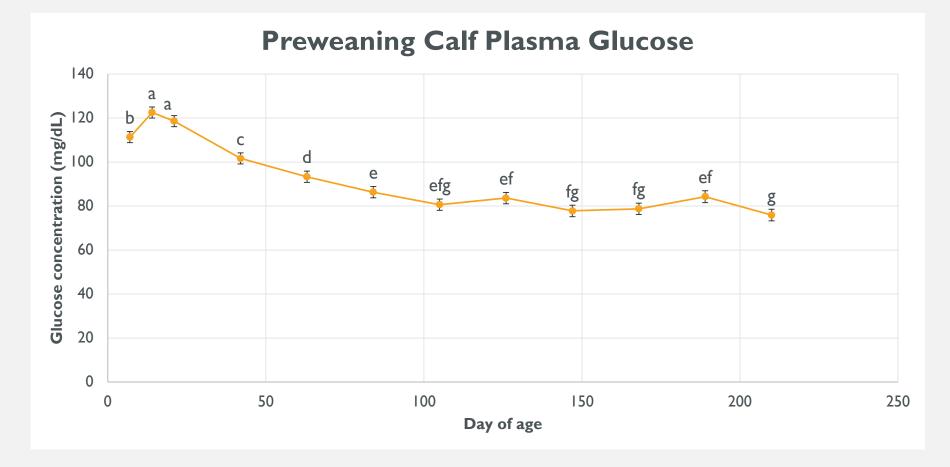
METHODS – SAMPLE COLLECTION

- Blood collected from jugular vein at 7, 14, 21, 42, 63, 84, 105, 126, 147, 168, 189, and 210 days of age
 - 2 serum tubes: no additives (Vacutainer[®], Becton Dickinson)
 - I plasma glucose tube: 15 mg of sodium fluoride and 12 mg of potassium oxalate (Vacutainer[®], Becton Dickinson)
- Tubes were kept on ice until centrifuged at 1500 X g at 4°C for 30 min
 - Multiple aliquots were made and stored at -20°C

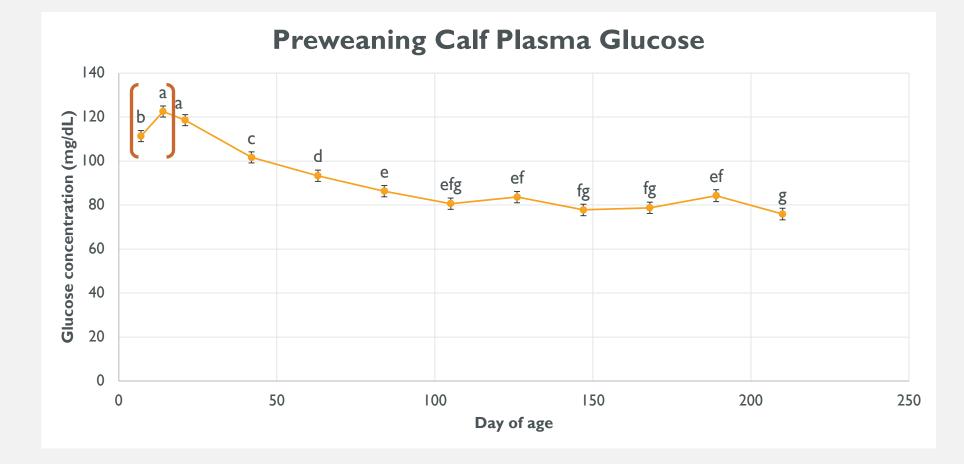
METHODS – METABOLITE ANALYSIS

- Analyzed on a 96 well-plate through a UVvisible light microplate reader (Synergy HT, BioTek Instruments, Inc.)
- Samples were run in duplicates
- Controls came from pooled samples
- Commercially available kit was used to measure plasma glucose
 - Infinity Glucose Hexokinase kit from Thermo Scientific; absorbance read at 340 nm

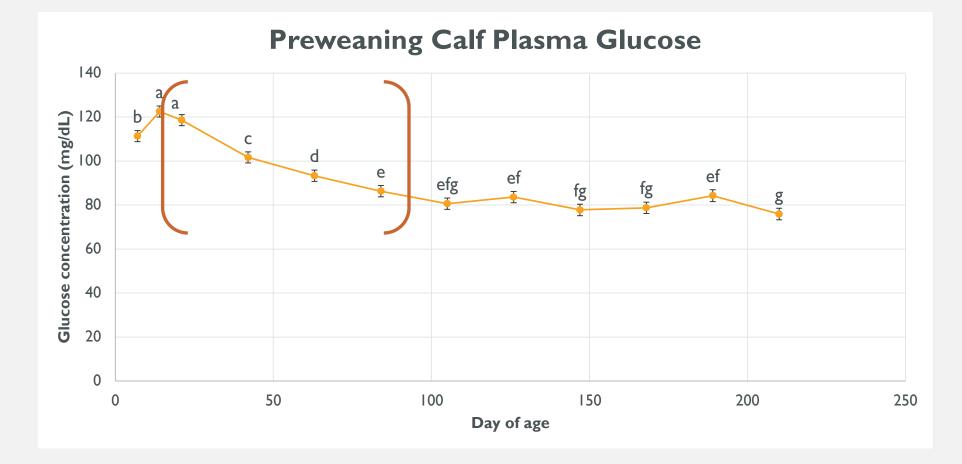




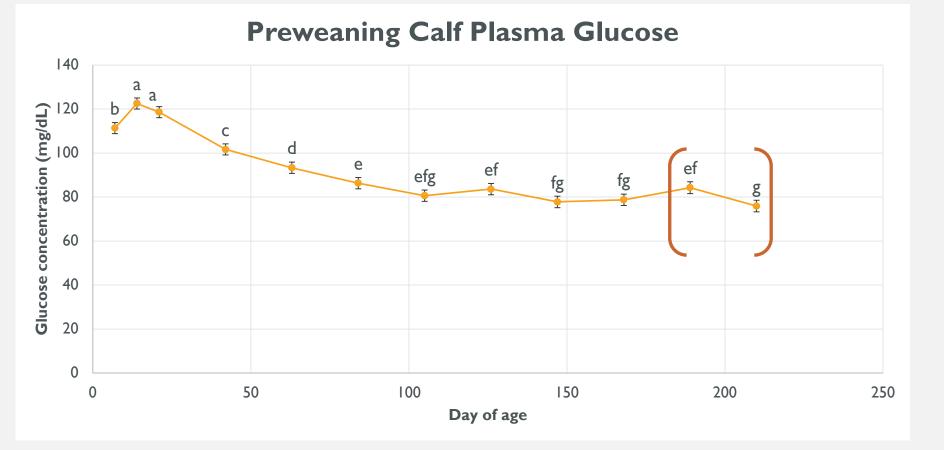
- Nutr Plane: P = 0.15
- Day: P < 0.0001
- Nutr x Day: *P* = 0.11



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CONCLUSIONS

- Maternal nutrient restriction did not have an effect on preweaning calf plasma glucose concentrations
- Over time, glucose concentration decreases, which may indicate development of the rumen







THANK YOU



National Institute of Food and Agriculture